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MACROECONOMIC IMPACT OF POPULATION AGING

Macroeconomic Consequences of Population Aging in the United States: Overview of a National Academy Report[†]

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I. Population Aging

In the United States and many other countries populations will age at rapid rates over the next few decades. Population aging results from longer life, lower fertility, and initial age distributions.

Rising US life expectancy has added years of life not only in old age but also in the current working ages of 20 to 65. The Trustees Report (2011) projected life expectancy to rise to 82.2 years in 2050, but the National Research Council's Committee on the Long-Run Macroeconomic Effects of the Aging US Population projected it to rise to 84.5 by 2050, in line with various other studies. In 1950 people spent 15 percent of total expected life years in retirement; in 2010 that had risen to 19 percent; by 2050 it is projected to rise to 24 percent (combining TR 2011 with our demographic projections).

A natural response to lengthening life might be a parallel extension of working life. However, much of population aging is due to low fertility and inherited age distributions including the

massive US baby boom, and these also require adjustments.

Fertility in the United States has been 2.0 to 2.1 births per woman in recent decades, close to replacement level, although it declined in the Great Recession to below 1.9 by 2012 (Hamilton, Martin, and Ventura 2013).

Most rich nations have had substantially lower fertility, averaging around 1.4 to 1.5, more than a half child lower than the United States. Furthermore, the United States had a massive baby boom after World War II. Primarily for these reasons the US population has been relatively young among the industrial nations, and although it will age rapidly in coming decades, it will remain relatively young. Nonetheless, the proportion age 65 and over in the United States rose from 8 percent in 1950 to 13 percent in 2010 and is expected to rise above 20 percent by 2030 as the baby boom moves into old age. The Old Age Dependency Ratio (OADR, ratio of population age 65 and above to age 20 to 64) is projected to rise from 0.22 in 2010 to 0.39 in 2050.

The past increase in the population share of the elderly has been accompanied by a striking increase in consumption by the elderly compared to consumption by younger adults. The ratio of consumption in the early 80s to the early 20s approximately doubled between 1960 and 2007 (NRC, 2012:48), raising the cost of past and projected population aging.

The Weighted Support Ratio (WSR) is perhaps a better indicator than the OADR of the macroeconomic impact of population aging. It is based on age profiles of consumption and labor income in a base period. The support ratio in a given year is the ratio of the population age distribution in that year multiplied times that base year age profile of labor income and divided by a similar product sum for consumption (Cutler

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et al. 1990). The Report projects the WSR to decline by 12 percent between 2010 and 2050, or by 0.3 percent per year, close to Cutler et al. (1990). Due to population aging, consumption will rise 0.3 percent more slowly than otherwise.

What would it take to reduce the OADR in 2050 by 10 percent from 0.39 to 0.35? This would require an increase in fertility each year between now and then by 0.5 births, or an increase in net immigration by almost one million each year.

Might projected population aging fail to materialize in the coming decades? Probabilistic projections by the Committee indicate this is exceedingly unlikely.

A. Health and Disability

Population aging has very different implications depending on whether older people are largely vigorous and independent or are frail, disabled, and in need of care. Increased life expectancy has very different implications depending on the quality of the added years. In fact, disability does rise strongly with age, but at older ages it declined steadily in the 1980s and 1990s (NRC 2012). Disability is strongly inversely associated with level of education, and the higher educational attainment of more recent cohorts of elderly has contributed to the declining trend of disability. Increasing health and functional status at older ages has led to sayings such as “70 is the new 60.” In fact the self-reported health of 60-year-old men in the 1970s was about the same as for 69-year-olds in the 2000s (NRC 2012:90).

Unfortunately, a number of studies have found that this favorable trend for the elderly stopped around 2000 except for those over 85. Furthermore, in some studies the nearly old (40–64) have rising rates of ill health and disability, due to diabetes and obesity, although in other studies the trend is flat. These recent trends in disability and ill health are very troubling as the population ages.

The Committee developed its own projections of the ability of the population to supply labor through 2050 based on projected changes in age, race/ethnicity, and education in relation to measures of health such as obesity, cancer, heart disease, stroke, and major and minor health impairments. The conclusion was that

there would be very little change in the proportion of the population age 20–74 that could hypothetically supply labor between 2010 and 2050. Individual decisions and public policies may lead to a flat age at retirement in coming decades, but this will not be dictated by health and biology.

In light of the trends discussed above the Committee suggests age 65 is an obsolete boundary for defining old age and that the OADR is a misleading measure. Alternate measures can be based on functional status (Sanderson and Scherbov 2010).

B. Aging and the Labor Force

The macroeconomic consequences of population aging will depend in part on how long people choose to work in the future. Higher labor supply at older ages would mean less leisure for the elderly and might be difficult for some in manual occupations. However, it would also mean that fewer resources would need to be transferred to the elderly by younger workers and that the older workers would pay taxes that would help pay the higher costs for Social Security, Medicare, and Medicaid.

Between 1950 and 2010 labor force participation rates (LFP) for men 25–54 declined gradually, while they declined rapidly for men 55 and over until 1995 as age at retirement dropped. But after 1995 LFP above age 55 rose significantly, and men’s age at retirement likewise rose by 1.5 to 2 years through 2010. Trends for women are more complicated by their rising LFP, but since 1995 their mean age at retirement has also risen by 1.5 years. Although changes in fertility and mortality have certainly contributed to the changing age distribution of the labor force, rising rates of immigration and female LFP have also contributed.

The Committee’s projections indicate that the labor force growth rate will vary between 0.5 and 0.6 percent per year through 2050, down very substantially from the preceding 60 years. The mean age of the labor force has risen from 35 in 1980 to 40 in 2010, and the Committee’s projections indicate it will rise to 42 by 2040, while the share of prime age (25–54) workers will decline from 66 percent in 2010 to 61 percent in 2050. The share of older workers (55+) will more than double from 12 percent in 1990 to 24 percent in 2020, and 27 percent in 2050. The White Non-Hispanic share of the labor force will decline from two thirds in 2010 to a half in 2050.

Although the population and labor force will be aging, while ill health and disability rise strongly with age, nonetheless the capacity to work of the population age 20–74 will barely change over the next 40 years, declining from 91 to 89 percent, assuming no change in the proportion of the population with a given characteristic (e.g., educational attainment) that is disabled. There is very substantial room for increased labor supply at older ages.

The structure of public pension incentives has an important influence on retirement behavior, as has been demonstrated in cross-national studies (Gruber and Wise 1998). In the United States both Social Security and private Defined Benefit (DB) plans contain incentives for early retirement (e.g., after 35 years of work and contributions, further contributions have little or no effect on benefit levels, and treating Medicare as secondary insurer for older employees reduces their net value to employers). The ongoing switch from private DB to Defined Contribution (DC) pensions has reduced these incentives but not those in Social Security.

Would postponed retirement take jobs from the young? Under conditions of high unemployment this could happen, but over the longer term the economy has demonstrated its capacity to absorb tens of millions of new female workers and immigrant workers without causing unemployment. Comparative work by the Gruber-Wise project found no evidence that reducing the employment of older workers generated employment opportunities for the young, nor that raising the employment of older workers reduced the opportunities for the young.

There are various changes that would facilitate longer work. DB plans do not need to contain distortionary incentives, and these could be eliminated, including those in Social Security and Medicare. More flexible work hours and allowance for gradual retirement would make it easier for older workers to continue working. Retraining and continuing education of older workers may be useful, but the efficacy of such programs is unknown.

C. Innovation, Productivity, and Population Aging

Even a small effect of population aging on the rate of productivity growth would eventually dominate other effects of aging. There is

considerable research on how individual performance in various domains varies with age, but its relevance for productivity in the work force is not clear, particularly since work is often done in teams. The Committee concluded it would be best to rely on market-based measures of productivity such as wages or aggregate productivity. The Committee estimated earnings by experience curves for males by education with year dummies. Combining these estimates with projected age distributions of the labor force from 2010 to 2030, the Committee found that effects on productivity would be negligible.

The Committee also considered the small literature on the relation of aggregate age distribution to productivity growth, reestimated some key equations, and concluded that estimates are fragile and that any effects appear to be very small.

The Committee also considered innovations by age, where innovations are measured by patents or by the work for which the Nobel Prize is subsequently granted, or for great technological innovators, with a peak at age 39. But while age does appear to be an important influence on individual innovation, it does not explain variation across countries.

One concern is that population aging and postponed retirement may constrict the resources made available to younger scientists and in that way impede innovation. Besides this concern, however, it did not appear that population aging would lead to slower productivity growth.

D. Saving and Retirement Security

Population aging may affect national saving rates in various ways—perhaps leading to public sector dissaving due to pressure on public pensions and health care, and by altering the relative numbers of individuals at different ages who may have different saving behavior, for example. But individuals might also raise their saving and asset accumulation once they become aware of the long-term budgetary problems of government transfer programs, and of their increasing life expectancies. The literature on these points is not conclusive.

Another question is the extent to which individual and household savings and asset holdings are adequate to support consumption in retirement in the context of other public and private pensions and health care. Estimates of the share of older people with inadequate savings or

asset holdings range from a fifth to two-thirds. This wide spread reflects different definitions of adequacy, of the population considered, and of methods used. All these studies assume that scheduled public and private benefits will be forthcoming in the future.

However, projected population aging is already straining public pensions and health care systems, and it is likely that this will lead to restructuring that may include reduced benefits or increased taxes in the future. Many private pension programs are underfunded, and health care assistance for retirees is being cut back. Such future changes would worsen the adequacy status of many people and households in those studies.

There is great heterogeneity in preparedness for retirement. Lower income people have very few assets, but given the higher Social Security replacement rates at low incomes, asset income is less necessary for maintaining consumption levels, yet low assets leave households vulnerable to shocks and to possible adjustments to future benefit levels.

A variety of policy options might improve retirement income security. One is to broaden access to employment based retirement saving programs. Another is to encourage later retirement, giving workers more time to prepare for a shorter retirement. Improving reverse mortgages would give older people better access to an important asset. New forms of insurance against the risks of longevity, need for long-term care, inflation, and asset price fluctuations could also be valuable. Improved financial literacy through education and training has also been shown to be helpful. And putting both public and private pension and health insurance programs on a secure and sustainable basis is fundamentally important.

E. Will Population Aging Depress Rates of Return?

The rate of return on assets is of obvious importance for the incomes of retirees, particularly as defined benefit plans become rare. Will population aging and the retirement of the baby boom cause a collapse of asset prices and rates of return?

First, it is important to realize that capital markets are global, and the changing age distribution of the United States is of limited

importance. However, the global population is also aging. The OADR of the United States population is projected to remain substantially higher than the OADR of the global population through 2050, but when we weight each country's population by its projected per capita GDP, the US and global OADRs are very similar in 2010 and 2050, while the US OADR is higher in between (NRC 2012:157). These global trends will strongly influence the level of wages, capital labor ratios, and rates of return in the United States. The differing levels and timing of aging across countries and regions may induce flows of capital from the older countries to the younger ones, although many other factors are also at play, as the example of China illustrates.

Population aging in the United States is likely to raise private asset holding per capita and per worker. First, net worth rises strongly with age of household head. If that pattern persists, then higher proportions of the population in the older ages will raise assets per worker in a mechanical way, by about 20 percent by 2050. To the extent that workers and retirees realize that the longevity is rising they may save more or dissave less.

At the same time that population aging may raise private asset holdings, it may also raise public debt through pressure on the budgets of public pensions, health care, and long-term care. For this reason, the net effect of population aging on asset holdings in the United States is unclear.

If global population aging does cause an increase in asset intensity this would not be expected to cause any sudden change in asset returns or prices because population aging is very slow and predictable with no surprises for investors. Simulations of the effect of population aging on asset returns, with some assuming international capital flows, indicate a small decline in rates of return, by 0.3 percent to 1 percent in coming decades. Other simulations produce conflicting conclusions on whether population aging will increase or decrease the size of the equity premium. Empirical studies likewise yield conflicting conclusions about equity returns and prices.

Even if the asset intensity increases as populations age, it is possible that increasing investments in education will to some degree substitute quality and productivity of labor for numbers of workers, tending to prevent an increase in capital labor ratios.

Housing prices are important for the elderly. Because the US population is expected to continue to grow, unlike in many other rich countries, it is not expected that population aging will cause a general decline in housing prices. However, there are likely to be substantial regional variations.

F. Population Aging and Fiscal Outlook

As noted earlier, the weighted support ratio is projected to decline by 12 percent between 2010 and 2050. However, that understates the budgetary pressures of population aging on specific government programs for the elderly, such as Social Security, Medicare, or the institutional portion of Medicaid that pays long-term care costs for some elderly. Government programs finance a sizable proportion of consumption by the elderly, so population aging will stress the budgets of these programs and contribute to the overall government deficit.

Macroeconomic adjustment to population aging will require some combination of lower consumption (through increased saving or higher taxes) and increased labor supply, perhaps through later retirement. The public sector funds a large share of consumption in old age through programs such as Social Security and Medicare, so population aging strongly impacts the public sector. At the same time, it is through public policies that government can influence consumption by workers and by older age groups, and affect age at retirement and the demand for older workers. Furthermore, government programs will largely determine which ages and which generations bear the costs of population aging. For example, the same fiscal adjustment could be achieved by cutting Social Security benefits or by raising payroll taxes with very different effects on workers versus retirees and earlier versus later born generations. Similarly, policies could have very different impacts on higher and lower income individuals within a generation.

The long-term fiscal imbalance in the United States is well known, and population aging is an important driver of that imbalance. However, it would be very difficult to isolate the role of population aging because that would require evaluation of a counterfactual in which government programs might also have differed had fertility remained higher and longevity not increased.

Most analysts believe that the biggest problem is the increase in costs of publicly provided health care, but the future trajectory of cost growth is murky. There has been a striking slowdown in rate of excess cost growth (growth of age-adjusted health spending minus growth of GDP), but it is not known to what extent this reflects the recession, the new Affordable Care Act, or other factors such as more plans with higher deductibles (Chandra, Holmes, and Skinner 2013). Official federal projections of health costs reflect this uncertainty.

Population aging is expected to be ongoing. It will be particularly rapid over the next three decades and continue thereafter at a slower pace as mortality continues to fall. If the government were to try to smooth its impact across the generations, that would require building up a substantial fund, the income from which could help to fund the costs of the older population. A different approach would be to set a goal such as keeping the debt-to-GDP ratio in 2050 equal to its current value. The Committee, drawing on Auerbach and Gale (2012), found that under optimistic and pessimistic assumptions an adjustment that is implemented in 2012 would have to be between 1.1 and 4.8 percent of GDP annually, and if delayed until 2032 would have to be between 2.2 and 7.7 percent (NRC 2012:187). This calculation also shows the cost of postponing action. Auerbach and Gale (2013) presents rather different estimates.

II. Conclusion

Population aging poses serious challenges, but these are not insurmountable, and they appear smaller than those faced by most other rich nations. There are many possible policy responses to improve the fiscal stability of government programs, encourage increased labor supply, and encourage private savings. At the same time policy should be alert to which ages, generations, and socioeconomic groups bear the costs of proposed adjustments, and to the effects of adjustments on incentives and efficiency. If adjustments are postponed they will have to be larger.

REFERENCES

- Auerbach, Alan J., and William Gale. 2012. "The Federal Budget Outlook: No News is Bad News (Updated)." *Tax Notes*.

- Auerbach, Alan, and William Gale.** 2013. "Fiscal Myopia." Unpublished.
- Board of Trustees, Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds.** 2011. *The 2011 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds*. Washington, DC: US Government Printing Office
- Chandra, Amitabh, Jonathan Holmes, Jonathan Skinner.** 2013. "Is This Time Different? The Slowdown in Healthcare Spending." National Bureau of Economic Research Working Paper 19700.
- Cutler, David M., James M. Poterba, Louise M. Sheiner, Lawrence H. Summers.** 1990. "An Aging Society: Opportunity or Challenge?" *Brookings Papers on Economic Activity* (1): 1–56.
- Gruber, Jonathan, and David Wise.** 1998. "Social Security and Retirement: An International Comparison." *American Economic Review* 88 (2): 158–63.
- Hamilton, Brady E., Joyce A. Martin, and Stephanie J. Ventura.** 2013. "Births: Preliminary Data for 2012." US Department of Health and Human Services, National Vital Statistics Reports 62 (3).
- National Research Council.** 2012. *Aging and the Macroeconomy: Long-Term Implications of an Older Population*. Washington, DC: National Academies Press.
- Sanderson, Warren C., and Sergei Scherbov.** 2010. "Remeasuring Aging." *Science* 329 (5997): 1287–1288.

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